Taylor’s Hypothesis and Pressure from Particle Image Velocimetry

Taylor’s hypothesis has since long been a useful tool in turbulence research. However, for shear flow it does not always hold and alternative techniques are required to pour time into space (or vice versa). Recently, I developed a data driven technique to overcome this short coming by using cross-spectra for frequency-wavenumber mappings (de Kat & Ganapathisubramani 2015).

Despite its limitations shear flow, Taylor’s hypothesis is still widely used and can useful as an engineering tool. One recent use is in estimating pressure from particle image velocimetry (PIV). Using Taylor’s hypothesis, the current state-of-the art techniques in pressure estimation techniques (e.g. de Kat & van Oudheusden 2012) can be simplified and time-resolved stereoscopic-PIV, snapshot tomographic-PIV, and even snapshot planar-PIV can be used to estimate pressure in 3D convective turbulent flows (de Kat & Ganapathisubramani 2013, Laskari et al. 2016, de Kat et al. 2016).

References:

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